

WHAT IS CLAIMED IS:

1. An automatic gain control method comprising:

a frequency conversion process for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

a first gain control process for controlling a gain of the high frequency signal;

a second gain control process for controlling a gain of the intermediate frequency signal;

a gain determination process for determining the gains in the first and the second gain control processes based on the intermediate frequency signal after gain control, so that a signal level of the intermediate frequency signal becomes a predetermined value;

a level detection process for detecting signal levels at a plurality of points on a signal path ranging from after the gain of the high frequency signal is controlled in the first gain control process to before the gain of the intermediate frequency signal is controlled in the second gain control process; and

a third gain control process for controlling a signal level in the signal path, so that a difference between the signal levels detected in the level detection process becomes a predetermined constant value.

2. An automatic gain control circuit comprising:

frequency conversion means for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

first gain control means for controlling a gain of the high frequency signal;

second gain control means for controlling a gain of the intermediate frequency signal;

control means provided later than the second gain control means, for controlling the gains of the first and the second gain control means;

detection means for detecting signal levels at a plurality of points on a signal path between the first and the second gain control means; and

third gain control means provided on the signal path, in which a gain is controlled so that a difference between the signal levels at the detection points becomes a constant value.

3. The automatic gain control circuit as set forth in claim 2, wherein:

the third gain control means is provided later than the frequency conversion means.

4. The automatic gain control circuit as set forth

in claim 2, wherein:

the first gain control means is made up of a PIN diode; and

the third gain control means is made up of a dual-gate field-effect transistor.

5. The automatic gain control circuit as set forth in claim 2, wherein:

the control means and the detection means are integrated in an identical integrated circuit.

6. An automatic gain control method comprising:

a frequency conversion process for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

a first gain control process for controlling a gain of the high frequency signal;

a second gain control process for controlling a gain of the intermediate frequency signal; and

a gain determination process for determining the gains in the first and the second gain control processes based on the intermediate frequency signal after gain control, so that a signal level of the intermediate frequency signal becomes a predetermined value,

wherein the gain determination process includes a

gain distribution process for fixing the gain in the second gain control process when a sum of the gains in the first and the second gain control processes falls short of a predetermined switching point,

the automatic gain control method further comprising:

a level detection process for detecting a signal level at a specific point on a signal path ranging from after the gain of the high frequency signal is controlled in the first gain control process to before the gain of the intermediate frequency signal is controlled in the second gain control process, in a state where the high frequency signal with a signal level by which the sum of the gains falls short of the switching point is inputted to the input terminal; and

a third gain control process for controlling the gain of the intermediate frequency signal after the gain is controlled in the second gain control process, so that the signal level detected in the level detection process becomes a predetermined value.

7. An automatic gain control method comprising:

a frequency conversion process for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

a first gain control process for controlling a gain of the high frequency signal;

a second gain control process for controlling a gain of the intermediate frequency signal; and

a gain determination process for determining the gains in the first and the second gain control processes based on the intermediate frequency signal after gain control, so that a signal level of the intermediate frequency signal becomes a predetermined value,

wherein the gain determination process includes a gain distribution process for fixing the gain in the second gain control process when a sum of the gains in the first and the second gain control processes falls short of a predetermined switching point,

the automatic gain control method further comprising:

a level detection process for detecting a signal level at a specific point on a signal path ranging from after the gain of the high frequency signal is controlled in the first gain control process to before the gain of the intermediate frequency signal is controlled in the second gain control process, in a state where the high frequency signal with a signal level by which the sum of the gains falls short of the switching point is inputted to the input terminal; and

a switching point adjustment process for adjusting the switching point so that the signal level detected in the level detection process becomes a predetermined value.

8. An automatic gain control circuit comprising:

frequency conversion means for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

first gain control means for controlling a gain of the high frequency signal;

second gain control means for controlling a gain of the intermediate frequency signal; and

control means provided later than the second gain control means, for controlling the gains of the first and the second gain control means,

wherein the control means fixes the gain of the second gain control means when a sum of the gains directed to the first and the second gain control means falls short of a predetermined switching point,

the automatic gain control circuit further comprising:

detection means for detecting a signal level at a specific point on a signal path between the first and the second gain control means;

third gain control means provided between the second gain control means and the control means; and

gain setting means for setting a gain of the third gain control means so that an output of the detection means in a state where the high frequency signal with a signal level by which the sum of the gains falls short of the switching point is inputted to the input terminal becomes a predetermined value.

9. An automatic gain control circuit comprising:

frequency conversion means for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

first gain control means for controlling a gain of the high frequency signal;

second gain control means for controlling a gain of the intermediate frequency signal; and

control means provided later than the second gain control means, for controlling the gains of the first and the second gain control means,

wherein the control means fixes the gain of the second gain control means when a sum of the gains directed to the first and the second gain control means falls short of a predetermined switching point,

the automatic gain control circuit further

comprising:

detection means for detecting a signal level at a specific point on a signal path between the first and the second gain control means; and

switching point adjustment means for adjusting the switching point so that an output of the detection means in a state where the high frequency signal with a signal level by which the sum of the gains falls short of the switching point is inputted to the input terminal becomes a predetermined value.

10. An automatic gain control method comprising:

a frequency conversion process for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

a first gain control process for controlling a gain of the high frequency signal;

a second gain control process for controlling a gain of the intermediate frequency signal; and

a gain determination process for determining the gains in the first and the second gain control processes based on the intermediate frequency signal after gain control, so that a signal level of the intermediate frequency signal becomes a predetermined value,

wherein the gain determination process includes a

gain distribution process for fixing the gain in the second gain control process when a sum of the gains in the first and the second gain control processes falls short of a predetermined switching point,

the automatic gain control method further comprising:

a first start input level detection process for detecting an input signal level at a point where fixing of the gain in the second gain control process is started, by inputting the high frequency signal to the input terminal with changing a signal level and monitoring the gains determined in the gain determination process;

a first switching point adjustment process for adjusting the switching point so that a value of the fixed gain is increased by an amount the detected input signal level exceeds a predetermined reference value;

a second start input level detection process for detecting again an input signal level at a point where fixing of the gain in the second gain control process is started, with changing a signal level, after the first start input level detection process; and

a second switching point adjustment process for adjusting the switching point so that a value of the fixed gain is increased by an amount the detected input

signal level exceeds a predetermined reference value.

11. The automatic gain control method as set forth in claim 10, comprising a demodulation process for demodulating the intermediate frequency signal after gain control,

wherein receiving performance in the demodulation process is inspected in at least one of the first and the second start input level detection processes, by using the high frequency signal applied to the input terminal with changing the signal level.

12. An automatic gain control circuit comprising:
frequency conversion means for converting a high frequency signal applied via an input terminal to an intermediate frequency signal;

first gain control means for controlling a gain of the high frequency signal;

second gain control means for controlling a gain of the intermediate frequency signal; and

control means provided later than the second gain control means, for controlling the gains of the first and the second gain control means,

wherein the control means fixes the gain of the second gain control means when a sum of the gains

directed to the first and the second gain control means falls short of a predetermined switching point,

the automatic gain control circuit further comprising:

judgment means for monitoring the gains directed to the first and the second gain control means, and judging whether or not fixing of the gain of the second gain control means is started; and

switching point adjustment means for adjusting the switching point so that a value of the fixed gain is increased by an amount a signal level of the high frequency signal applied to the input terminal when start of the fixing of the gain is detected exceeds a predetermined reference value.

13. An automatic gain control method comprising:

a frequency conversion process for converting a frequency component of a specific channel in a high frequency signal applied via an input terminal, to an intermediate frequency signal;

a first gain control process for controlling a gain of the high frequency signal;

a second gain control process for controlling a gain of the intermediate frequency signal; and

a gain determination process for determining the

gains in the first and the second gain control processes based on the intermediate frequency signal after gain control, so that a signal level of the intermediate frequency signal becomes a predetermined value,

wherein the gain determination process includes a gain distribution process for fixing the gain in the second gain control process when a sum of the gains in the first and the second gain control processes falls short of a predetermined switching point,

the automatic gain control method further comprising:

a storage process for prestoring combinations each having a specified value of the gain directed in the first gain control process and a specified value of a signal level at a specific point on a signal path ranging from after the gain of the high frequency signal is controlled in the first gain control process to before the gain of the intermediate frequency signal is controlled in the second gain control process;

a measurement process for monitoring the signal level at the specific point and the gain directed in the first gain control process; and

a switching point adjustment process for adjusting the switching point when a combination of the signal level and the gain measured in the measurement process is

not included in the combinations of the specified values stored in the storage process, so that the combination of measured values is included in the combinations of the specified values.

14. An automatic gain control circuit comprising:

frequency conversion means for converting a frequency component of a specific channel in a high frequency signal applied via an input terminal, to an intermediate frequency signal;

first gain control means for controlling a gain of the high frequency signal;

second gain control means for controlling a gain of the intermediate frequency signal; and

control means provided later than the second gain control means, for controlling the gains of the first and the second gain control means,

wherein the control means fixes the gain of the second gain control means when a sum of the gains directed to the first and the second gain control means falls short of a predetermined switching point,

the automatic gain control circuit further comprising:

detection means for detecting a signal level at a specific point on a signal path between the first and the

second gain control means;

gain monitoring means for detecting the gain directed to the first gain control means;

storage means for storing combinations each having a specified value of the signal level detected by the detection means and a specified value of the gain detected by the gain monitoring means; and

switching point adjustment means for adjusting the switching point when a combination of measured values obtained by the detection means and the gain monitoring means is not included in the combinations of the specified values stored in the storage means, so that the combination of the measured values is included in the combinations of the specified values.